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10/590,901	07/12/2007	Herbert Schwarzbauer	1454.1737	5609

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EXAMINER	
POMPEY, RON EVERETT	
ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/590,901	SCHWARZBAUER, HERBERT	
	Examiner	Art Unit	
	Ron Pompey	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 June 2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *27-29,32,34,35,37-52,54,56 and 57* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *27-29,32,34,35,37-52,54,56 and 57* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 August 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/16/11*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 27, 29, 34-35, 37-39, 42, 46-47 and 52-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Nicholas** (US 4546534), in view of **Botzenhardt** (US 3935635).

3. **Nicholas** discloses the limitations of:

In re Claim 27: A system comprising:

an electrical component (fig. 2) provided with at least one electrical contact surface (14, fig. 2);

an electrical insulating layer (2, fig. 12/15, fig. 13), which is disposed on the component, the electrical insulating layer having an opening (16 and 17, fig. 14) to expose and surround a portion of the contact surface (14, fig. 2), the insulating layer having a lateral surface that delimits the opening (14, fig. 2), and

an electrical connecting lead (20 and 21, fig. 2) for electrically contacting the contact surface of the component, the electrical connecting lead comprising first and metallization layer, the first metallization consisting of only a single layer (20 and 21, fig. 2) and being located on the lateral surface, such that the first metallization layer meets the contact surface (13 and 14, fig. 2) at an angle less than 90 degrees.

In re Claim 29: The system as claimed in claim 27, wherein the first metallization layer (20 and 21, fig. 2) has a layer thickness within a range of from 0.5 µm to 30 µm (1µm; col. 5, lns. 67-68).

In re Claim 34: The system as claimed in claim 27, wherein the insulating (2, figs. 12/14 and 15, figs. 13/14) layer is formed by laminating at least one insulating foil onto the component (15, fig. 13).

In re Claim 35: The system as claimed in claim 34, wherein

the lateral surface of the insulating layer faces (inside surfaces of layer 2/15, fig. 14) the component (the IGFET (11/13/14), fig. 14),

at least one part of the insulating foil (15, fig. 13; col. 5, lns. 57-62) is laminated onto the component (the IGFET(11/13/14), fig. 14) in such a way that the insulating layer has a surface contour facing away from the component, and

a surface contour of the component is shown in the surface contour of the insulating foil that faces away from the component.

In re Claim 38: The system as claimed in claim 37, wherein the first and/or second metallization layer (20/21, fig. 2) and/or the section is formed of at least one metal selected from the group consisting of aluminum, gold, copper, molybdenum, silver, titanium and tungsten (aluminum, col. 5, lns. 67-68).

In re Claim 39: The system as claimed in claim 36, wherein the component is a semiconductor component (the IGFET (11/13/14), fig. 14).

In re Claim 42: The system as claimed in claim 27, wherein the insulating layer has a plurality of openings arranged in a row or a matrix (openings 16 and 17 are in a row, fig. 1).

In re Claim 46: A method for producing a system comprising:

providing a component (IGFET (11/13/14), fig. 2) with an electrical contact surface (13 and 14, fig. 2);

producing an insulating layer (2, fig. 12/15, fig. 13) on the component, the insulating layer having an opening (16 and 17, fig. 14) to expose and surround a portion of the contact surface (13 and 14, fig. 14) of the component so that the contact surface is freely accessible, the insulating layer having a lateral surface that defines the opening; and

forming a metallization layer (20 and 21, fig. 2) of a connecting lead on the lateral surface of the insulating layer in such a way that the metallization layer meets the contact surface at an angle less than 90 degrees the metallization layer consisting of only a single layer;

In re Claim 47: The method as claimed in claim 46, wherein the insulating layer is formed by a process comprising: laminating at least one insulating foil (15, fig. 13) onto the component (IGFET (11/13/14), fig. 13; and producing an opening (16 and 17, fig. 14) in the insulating foil so that the contact surface (13/14, fig. 14) of the component is exposed.

In re Claim 52: The method as claimed in claim 46, wherein the metallization layer and/or the insulating layer is formed by a vapor deposition method (evaporation, col. 2, lns. 67 - 68).

4. **Nicholas**, as indicated above, discloses all the features of the claims **except:**

In re Claim 27: wherein the electrical connecting lead comprising a second metallization layers, the second metalization layer being formed of a material different from the first metallization layer, the second metallization layer being formed directly on a portion of the first metallization layer, the second metallization layer being formed over ~~on~~ the insulating layer and outside of the opening in the insulating layer, the second metallization layer having a thickness greater than that of the first metallization layer.

In re Claim 37: The system as claimed in claim 36, wherein the second metallization layer is electrodeposited.

In re Claim 46: wherein after forming the metallization layer, masking the opening in the insulating layer; and

forming a section of the connecting lead separately from the metallization layer, the section of the connecting lead being produced on the insulating layer while the opening in the insulating layer is masked such that the section of the connecting lead is formed outside of the opening in the insulating layer, the section of the connecting lead being formed directly on a portion of the first metallization layer and having a thickness which exceeds that of the metallization layer.

In re Claim 54: The method as claimed in Claim 46, wherein a metal is electrodeposited to produce the section on the insulating layer.

In re Claim 56: (New) The method as claimed in claim 46, wherein the section of the connecting lead is formed from a different material from the metallization layer.

a. However, **Botzenhardt discloses**:

In re Claim 27: wherein the electrical connecting lead comprising a second metallization layer (8, fig. 5), the second metalization layer being formed of a material (gold 8, fig. 5, claim 5, element 8 is the thickened contact) different from the first metallization layer (4, fig. 5, col. 3, lns. 60-67), the second metallization layer (8, fig. 5) being formed directly on a portion of the first metallization layer (4, fig. 5), the second metallization layer (8, fig. 5) being formed over the insulating layer (3, fig. 5) and outside of the opening (opening where contact 4 first metallization is formed in fig. 2) in the insulating layer, the second metallization layer (8, fig. 5) having a thickness greater than that of the first metallization layer (4, fig. 5).

In re Claim 37: The system as claimed in claim 36, wherein the second metallization layer (8, fig. 5) is electrodeposited (col. 4, lns. 24-33).

In re Claim 46: wherein after forming the metallization layer (4, fig. 5), masking (5/7, fig. 5) the opening in the insulating layer (3, fig. 5); and

forming a section (8, fig. 5) of the connecting lead (4/8, fig. 5) separately from the metallization layer (4, fig. 5), the section of the connecting lead (4/8, fig. 5) being produced on the insulating layer (3, fig. 5) while the opening in the insulating layer is masked (5/7, fig. 5) such that the section of the connecting lead is formed outside of the opening (opening where 4 sit in insulating layer 3, fig. 5) in the insulating layer, the section of the connecting lead (8, fig. 5) being formed directly on a portion of the metallization layer (4, fig. 5) and having a thickness which exceeds that of the metallization layer (4, fig. 5).

In re Claim 54: The method as claimed in Claim 7, wherein a metal is electrodeposited to produce the section on the insulating layer (col. 4, lns. 24-33).

In re Claim 56: (New) The method as claimed in claim 46, wherein the section (gold 8, fig. 5, claim 5) of the connecting lead is formed from a different material from the metallization layer different from the metallization layer (4, fig. 5, col. 3, lns. 60-67 or claims 6 and 7).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the connecting lead 20 or 21, fig. 2 in **Nicholas**, with second metallization layers or section of the connecting lead is formed separately from the metallization layer, the second metallization layers or section of the connecting lead being produced on the insulating layer while the opening in the insulating layer is masked such that the section of the connecting lead is formed outside of the opening in the insulating layer, the section of the connecting lead having a thickness which exceeds that of the metallization layer (In re claims 27, 46 and 56) and wherein the section of the connecting lead is electrodeposited (In re claims 37 and 54) by **Botzenhardt**, because this will provide for fine pattern resolution and electrodes can be selectively formed in various positions and at various widths, by not being limited to connection only at the site of the opening in the insulating layer; therefore the increase in the degree of freedom of connection between external equipment and the semiconductor package is improved.

5. Claims 28 and 43 rejected under 35 U.S.C. 103(a) as being unpatentable over **Nicholas** in view of **Bozenhardt** as applied to claim 27 above, in view of **Seales** (US 3945030).

6. **Nicholas and Guthrie**, as indicated above, discloses all the features of the claims **except:**

In re Claim 28: The system as claimed in claim 27, wherein the first metallization layer is oriented at an angle to the contact surface within a range of from 30° to 80°.

In re Claim 43: (New) The system as claimed in claim 27, wherein the first metallization layer is oriented at an angle to the contact surface within a range of from 50° to 70°.

b. However, **Seales discloses**:

In re Claim 28: (New) The system as claimed in claim 27, wherein the first metallization layer (96/97.98, fig. 13) is oriented at an angle to the contact surface within a range of from 30° to 80° (col. 1, lns. 55 – 68) .

In re Claim 43: (New) The system as claimed in claim 27, wherein the first metallization layer is oriented at an angle to the contact surface within a range of from 50° to 70° (col. 1, lns. 55-68).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the orientation angle of the metallization layer in **Nicholas** and **Bozenhardt**, with metallization layer being oriented at an angle to the contact surface within a range of from 30° to 80° as taught by **Seales**, because it makes

it possible to obtain excellent contact metallization as disclosed in column 2, lines 24-28.

7. Claims 32 and 44-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Nicholas** in view of **Bozenhardt** as applied to claim 27 above.

8. **Nicholas and Bozenhardt**, as indicated above, discloses all the features of the claims **except:**

In re Claim 32: The system as claimed in claim 27, wherein the insulating layer has a layer thickness within a range of from 20 µm to 500 µm.

In re Claim 44: The system as claimed in claim 27, wherein the first metallization layer has a layer thickness within a range of from 2.0 µm to 20 µm.

In re Claim 45: (New) The system as claimed in claim 27, wherein the insulating layer has a layer thickness within a range of from 50 µm up to and including 200 µm.

a. However, it would have been obvious to one of ordinary skill in the art at the time the invention to modify the thickness of the insulating and metallization layer in Nicholas, with the insulating layer having a thickness within a range of from 20 µm to 500 µm(In re Claim 32) or 50 µm up to an including 200 µm(In re Claim 45) and the metallization layer having a thickness within a range of from 2.0 µm to 20 µm(In re Claim 44) as claimed, because the thicker insulator will reduce hot carrier which increase reliability of the device and thicker metal layer will last longer under electrical and thermal stresses to make the device more durable, since it has been held that where the general conditions of a claim are disclosed in prior art, discovering the

optimum or working ranges involves only routine skill in the art. In re Aller,105 USPQ 233.

9. Claims 40 and 41 rejected under 35 U.S.C. 103(a) as being unpatentable over **Nicholas** in view of **Bozenhardt** as applied to claim 39 above, in view of Admitted Prior Art (APA).

10. **Nicholas** and **Guthrie**, as indicated above, discloses all the features of the claims **except:**

In re Claim 40: (New) The system as claimed in claim 39, wherein the semiconductor component is a power semiconductor component.

In re Claim 41: (New) The system as claimed in claim 40, wherein the power semiconductor component is a component selected from the group consisting of a diode, a MOSFET, a IGBT, a thyristor and a bipolar transistor.

c. **However, APA discloses**:

In re Claim 40: (New) The system as claimed in claim 39, wherein the semiconductor component is a power semiconductor component ([0003]).

In re Claim 41: (New) The system as claimed in claim 40, wherein the power semiconductor component is a component selected from the group consisting of a diode, a MOSFET, a IGBT, a thyristor and a bipolar transistor ([0003]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the integrated circuit(IC) in Nicholas, with the power

semiconductor component as taught by APA, because Nicholas is silent to what kind of IC is being formed.

11. Claims 48 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Nicholas** in view of **Bozenhardt** as applied to claim 46 above, in view of Neugenbauer et al. (US 5291066).

12. **Nicholas** and **Guthrie**, as indicated above, discloses all the features of the claims **except:**

In re Claim 48: The method as claimed in claim 47, wherein the insulating foil is laminated under a partial vacuum.

In re Claim 49: The method as claimed in claim 47, wherein the opening in the insulating foil is made by laser ablation.

d. **However, Neugenbauer discloses**:

In re Claim 48: The method as claimed in claim 47, wherein the insulating foil (18/20, figs. la and 3b) is laminated under a partial vacuum (cvd, ALE, col. 7, lns. 5 - 22).

In re Claim 49: The method as claimed in claim 47, wherein the opening (25, figs. la and 3a) in the insulating foil is made by laser ablation (col. 8, lns. 31- 51).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify how the insulating foil is laminated and how the opening in the insulating foil is made in **Nicholas** and **Guthrie**, with the insulating foil being

laminated under a partial vacuum (In re Claim 48) and forming the opening in the insulating foil by laser ablation (In re Claim 49) taught by **Neugenbauer**, because Nicholas is silent to particulars of how the insulating foil is laminated and how the opening in the insulating foil is made.

13. Claims 50 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Nicholas** in view of **Bozenhardt** as applied to claim 46 above, in view of **Kao** et al. (US 6338361).

14. **Nicholas** and **Bozenhardt**, as indicated above, discloses all the features of the claims **except:**

In re Claim 50: The method as claimed in claim 46, wherein in order to produce the insulating layer on the component, a compressed air process is used wherein paint is applied to the component.

In re Claim 51: The method as claimed in claim 50, wherein the paint is a photo-sensitive paint.

e. **However, Kao discloses**:

In re Claim 50: (New) The method as claimed in claim 46, wherein in order to produce the insulating layer (photoresist) on the component, a compressed air process is used wherein paint is applied to the component (col. 3, lns. 27-45).

In re Claim 51: (New) The method as claimed in claim 50, wherein the paint is a photo-sensitive paint (photoresist; col. 3, lns. 27 - 45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the insulating layer and how it is formed in **Nicholas** and **Bozenhardt**, with the photoresist paint method as taught by **Kao**, because using a photoresist as the insulating layer reduces steps, via a separate masking step is not need to form the opening in the insulating layer, which reduces cost of making the device.

15. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Nicholas** in view of **Bozenhardt** as applied to claim 46 above, in view of **Huang** (US 6452270).

16. **Nicholas** and **Bozenhardt** the second metallization layer is formed of copper or aluminum, as indicated above, discloses all the features of the claims **except:**

In re Claim 57: (New) The system as claimed in claim 27, wherein the first metallization layer is formed of a titanium tungsten alloy and the second metallization layer is formed of copper or aluminum.

f. **However, Huang discloses**:

In re Claim 57: (New) The system as claimed in claim 27, wherein the first metallization layer is formed of a titanium tungsten alloy (titanium tungsten (TiW) col.1, ln. 50) and the second metallization layer is formed of copper or aluminum (the Copper (Cu) layer is formed above the titanium tungsten (TiW) col.1, ln. 50-56).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the metallization layer in **Nicholas** and **Bozenhardt**, with the metallization layer is formed of a titanium tungsten alloy (TiW) as taught by **Huang**, because titanium tungsten alloy (TiW) is good for a barrier layer in package bonding.

Response to Arguments

2. Applicant's arguments with respect to claims 27-29, 32, 34, 35, 37-52, 54 and 56-61, received 06/08/2011, have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RON POMPEY whose telephone number is (571)272-1680. The examiner can normally be reached on 9AM - 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Garber can be reached on (571) 272-2194. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic

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/Ron Pompey/
Examiner, Art Unit 2812
08/29/2011